

RegenVillages – Integrated village designs for thriving regenerative communities

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Introduction

The U.N. (UNCTAD Report, 2013) outlines the urgent necessity for hyper-local, self-reliant village designs to prepare for 2+ billion additional people joining the planet by 2050.

The RegenVillages initiative is a model blueprint for industry, government, and academic action. The partnership seeks to accelerate the proliferation of affordable, integrated village designs that power and feed self-reliant communities thus tackling the challenges expected from climate change and overpopulation from an economic, social and environmental perspective.

“Regen” is a short form of “Regenerative” that defines sustainability through the lens and metrics of strong, self-reliant communities. This concept for modern village design is aspirational, heralding a refreshing and revitalized perspective on the development of “landed strata” by integrating proven technologies in innovative ways, such as built-environment energy positive dwellings, renewable power and micro-grid distribution, living machines for water and waste management, and organic aquaponic food production at scale, all combined in a total community management system.

Fragile Food Distribution Systems

Prior to the year 1800, 2% of humanity lived in self-sustaining, rural villages and small towns (Cohen, 2003). By 2020 an estimated 50% of the population (approximately 7.6 billion) will be crowded into coastal cities, and by 2050 the dire prediction is that nearly 75% of the global population (approximately 9.4 billion) will be jammed into urban and sub-urban environments

with strained power grids and depleted food matrices that will be unable to support consumption demands or guarantee continuous access to good water.

Over-crowded urban cities are a recipe for upheaval, especially as any kind of natural disaster or conflict zone could easily deprive tens of millions of people from access to power and sustenance. The NASA Handy Model (Motescharri, S. 2014) states that: “*Global industrial civilization could collapse due to unstable resource exploitation and increasingly unequal wealth distribution (...)*”, meaning that even a small disturbance to access for populations to meet their needs could be catastrophic and long lasting.

Reversing the trend of migration

The effects of climate change on coastal cities should lead top government officials to urgently look toward rural and suburban areas as relief valves for mitigating risks associated with overcrowded cities.

“The increasing number of people that migrate from rural to urban areas for jobs is a common scenario in developed and developing countries due to lack of economic opportunities in rural areas. This phenomenal growth has created the urbanised issues such as degradation of farmland and pastureland due to development, pollution, stress, increased daily life costs, and negative social aspects.” (Hazlinda, H. and Siti, N.A.H, 2014, UUM).”

Therefore, a focus on research, development and science-to-action implementation of village designs that could reverse the trend of migration from rural areas is needed. Summarily giving up on outer lying areas merely because the trend of exodus seems too great, is certainly one of the major cultural messaging obstacles that needs to be addressed to redefining rural areas as economically, environmentally and educationally attractive places to live, work and raise families.

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Research at the Stanford University Center for Design Research

The Center for Design Research (CDR) is a community of scholars focused on understanding and augmenting engineering design innovation practice and education. We are dedicated to facilitating individual creativity, understanding the team design process, and developing advanced tools and methods that promote superior design and manufacturing of products. We develop concepts and technical solutions for design thinking, concurrent engineering, distributed collaborative design and design knowledge reuse.

Our interest in this ReGen Village initiative stems from a new stream of research focused on the built environment. As natural resource systems are under increasing strain, then the proposition of a residential village that considers its own food production, energy generation, waste re-use, and water conservation will drastically reduce the reliance on municipal systems in the forthcoming resource economy. We propose a model intervention into prevailing modes of residential living at increasing scales of study to include the ReGen residential Unit and cluster of Units. Any site-specific ReGen Village design shall be the result of others in the professional realm.

Our research is a human-centered protocol that will measure the human utility, technical feasibility, and human desirability of the forthcoming ReGen villages. Our studies will be conducted through the structuring of historical data and new evidence generated from full scale industrial prototype villages created through ReGen Villages, EIR .

Our guiding questions include: 1) does Regen work?; if yes, how; if not, why?; all with a focus on the human and technical elements.

Project Implementation

The RegenVillage project focuses on 6 key areas of future design action:

1. Energy-positive, component homes from the built-environment research

Partnering with regional developers, construction and manufacturing companies, component dwelling designs will be further prototyped, utilizing in-country sustainable materials wherever possible.

2. Readily available and regionally appropriate renewable energy sources

Solar, wind, bio-fuel and waste-to-resource renewable energy sources will be implemented based on a combined protocol of regional context, readily available technologies with open APIs and cost-per-yield efficiencies. These will be incorporated with micro grid and grid-tie systems for load balancing and distribution of power.

3. High-yield organic food production via aquaponic systems

Soil-free aquaponic systems for high-yield organic food production encompass the use of fish tanks and adjacent grow beds to facilitate a closed-loop production cycle that has been shown to increase the yield of fruits and vegetables by up to 1/3 (Ehrlich, 2014) while preserving up to 90% of the water. The system produces both fish and vegetable/fruit protein for harvesting.

4. Water management and waste-to-resource system development

Water management and waste water to resource systems are integrated 'living machine' mechanisms intended to recycle, reuse and channel water and waste into energy resources at every level of village design implementation.

5. Incorporating Stanford and Local University Curriculum

In addition to the design research conducted at Stanford University, other partner universities will be engaged on a per-project basis to leverage cultural and climatic specificities upon which village designs shall benefit. The scope of curriculum for village residents will be based on community participation and interests in developing real-world products and services.

6. Socio-economic community enterprises fostered through incubation

It is predicted that nearly 47% of most employment will not exist within the next 20 years due to computerization (Benedikt and Osborne, 2013). The intent of this particular research focus is to rapidly deploy ideas that could become economic drivers, yielding revenue for participants and opportunities to employ other villagers in these incubated start-up businesses.

7. MEMS inputs for real-time data gathering to the cloud

Each village will be embedded with micro sensors at the substrate level of building components, fish tanks, plant beds and renewable energy APIs, which will broadcast real-time data feeds to a cloud database infrastructure. Cognitive computing algorithms will be applied that could either autonomously actuate system responses across platforms in each village and home, and/or notify human intervention.

8. Algorithms for semi-autonomous actuating of thriving mechanisms

The intent is to further streamline the thriving mechanisms through AI and robotics that will allow residents to grow a variety of diverse protein sources for both sustenance and economic benefit. These designs will allow the use of big data which will benefit community stakeholders, university research, municipal and national governments - all interested and involved in replicating successes by learning from the variables and outcomes.

CONCLUSION

RegenVillages has a global vision to bring science-to-action research to implement thousands of – regenerative, villages within the next decade, as a tipping point for scaling and replicating integrated village designs and retrofits as an urgent call to action for a planet and populations in distress.

The RegenVillages initiative will act as conduit for bringing design challenges and endowment funding to partner universities around the world, in addition to

providing safe, secure and self-reliant communities to life.

Building on an open-source ideology and partnering with national and municipal governments, major universities, industry partners, regional and local stakeholders at every level, RegenVillages seeks to dissolve barriers to rapid deployment and proliferation. An integrated focus on the human and technical issues is our special formula for success.

References

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